

CLAIMS

1. A process for installing a streamed application program on a client system
5 and executing said streamed application program on said client while concurrently streaming portions of said streamed application program from a server in a computer environment, comprising the steps of:
- receiving an installation information block for said streamed application
program from said server;
 - 10 providing file redirection means on said client for redirecting file accesses from said client's local file system to the streaming server's file system;
 - providing a file mapping database stored persistently on said client;
 - wherein said file mapping database contains a bi-directional mapping of
the client file system to the streaming server file system;
 - 15 wherein said file mapping database is updated with said streamed application program's file mapping data obtained from said installation information;
 - wherein said file redirection means performs said redirection using said file mapping database;
 - 20 providing registry interception means on said client for intercepting all registry calls on said client and redirecting calls that manipulate certain registries to an alternate path;
 - providing a registry database stored persistently on said client;
 - wherein said registry database contains mappings of original registry
25 paths to new alternate registry paths;
 - wherein said registry database is updated with said streamed application program's registry mapping data obtained from said installation information;
 - wherein said registry interception means uses said registry database to redirect registry calls;
 - 30 providing an application page cache on said client;
 - providing application page prefetching means on said client for requesting application pages of said streamed application program from said server;
 - wherein said application page prefetching means initially populates said
application page cache with an initial set of application pages when said
35 streamed application program is installed on said client, said initial set of application pages are specified in said installation information; and
 - installing the proper icons, aliases, and description onto said client that give the user the proper look and feel of the original application program.

2. The process of claim 1, wherein during execution of said streamed application program said streamed application program generates page requests, said application page prefetching means requests application pages from said server that are not resident in said application page cache and places said requested application pages in said application page cache.

3. The process of claim 1, wherein said application page prefetching means prefetches additional application pages that said streamed application program may need in the future from said server and places said additional application pages in said application page cache, and wherein said additional application pages are selected based on application page profiling data obtained from said installation information.

4. The process of claim 1, wherein the user selects the proper icon or alias to start said streamed application program.

5. The process of claim 1, wherein the user or administrator obtains a subscription to said streamed application program from a subscription server before installation of said streamed application program begins.

6. The process of claim 1, wherein said client obtains a license for said streamed application program from a license server before installation of said streamed application program begins.

7. The process of claim 6, wherein said license server gives said client an encrypted access token upon acknowledgment of a valid license.

8. The process of claim 7, wherein said client passes said encrypted access token to said server for validation before requesting application pages from said server.

9. The process of claim 1, wherein during the uninstallation of said streamed application program from said client, said file redirection means removes said streamed application program's file mapping data from said file mapping database.

10. The process of claim 1, wherein during the uninstallation of said streamed application program from said client, said registry interception means removes all

of said streamed application program's registry mapping data from said registry database.

11. The process of claim 1, wherein during the uninstallation of said streamed application program from said client, said application page prefetching means removes all of said streamed application program's application pages from said application page cache.

12. The process of claim 1, wherein during the uninstallation of said streamed application program from said client, said proper icons, aliases, and description are removed from said client.

13. An apparatus for installing a streamed application program on a client system and executing said streamed application program on said client while concurrently streaming portions of said streamed application program from a server in a computer environment, comprising:

a module for receiving an installation information block for said streamed application program from said server;

file redirection means on said client for redirecting file accesses from said client's local file system to the streaming server's file system;

a file mapping database stored persistently on said client;

wherein said file mapping database contains a bi-directional mapping of the client file system to the streaming server file system;

wherein said file mapping database is updated with said streamed application program's file mapping data obtained from said installation information;

wherein said file redirection means performs said redirection using said file mapping database;

registry interception means on said client for intercepting all registry calls on said client and redirecting calls that manipulate certain registries to an alternate path;

a registry database stored persistently on said client;

wherein said registry database contains mappings of original registry paths to new alternate registry paths;

wherein said registry database is updated with said streamed application program's registry mapping data obtained from said installation information;

wherein said registry interception means uses said registry database to redirect registry calls;

an application page cache on said client;

application page prefetching means on said client for requesting application pages of said streamed application program from said server;

wherein said application page prefetching means initially populates said application page cache with an initial set of application pages when said streamed application program is installed on said client, said initial set of application pages are specified in said installation information; and

a module for installing the proper icons, aliases, and description onto said client that give the user the proper look and feel of the original application program.

14. The apparatus of claim 13, wherein during execution of said streamed application program said streamed application program generates page requests, said application page prefetching means requests application pages from said server that are not resident in said application page cache and places said requested application pages in said application page cache.

15. The apparatus of claim 13, wherein said application page prefetching means prefetches additional application pages that said streamed application program may need in the future from said server and places said additional application pages in said application page cache, and wherein said additional application pages are selected based on application page profiling data obtained from said installation information.

16. The apparatus of claim 13, wherein the user selects the proper icon or alias to start said streamed application program.

17. The apparatus of claim 13, wherein the user or administrator obtains a subscription to said streamed application program from a subscription server before installation of said streamed application program begins.

18. The apparatus of claim 13, wherein said client obtains a license for said streamed application program from a license server before installation of said streamed application program begins.

19. The apparatus of claim 18, wherein said license server gives said client an encrypted access token upon acknowledgment of a valid license.

20. The apparatus of claim 19, wherein said client passes said encrypted access token to said server for validation before requesting application pages from said server.

5 21. The apparatus of claim 13, wherein during the uninstallation of said streamed application program from said client, said file redirection means removes said streamed application program's file mapping data from said file mapping database.

10 22. The apparatus of claim 13, wherein during the uninstallation of said streamed application program from said client, said registry interception means removes all of said streamed application program's registry mapping data from said registry database.

15 23. The apparatus of claim 13, wherein during the uninstallation of said streamed application program from said client, said application page prefetching means removes all of said streamed application program's application pages from said application page cache.

20 24. The apparatus of claim 13, wherein during the uninstallation of said streamed application program from said client, said proper icons, aliases, and description are removed from said client.

25 25. A program storage medium readable by a computer, tangibly embodying a program of instructions executable by the computer to perform method steps for installing a streamed application program on a client system and executing said streamed application program on said client while concurrently streaming portions of said streamed application program from a server in a computer environment, comprising the steps of:

30 receiving an installation information block for said streamed application program from said server;

providing file redirection means on said client for redirecting file accesses from said client's local file system to the streaming server's file system;

providing a file mapping database stored persistently on said client;

35 wherein said file mapping database contains a bi-directional mapping of the client file system to the streaming server file system;

wherein said file mapping database is updated with said streamed application program's file mapping data obtained from said installation information;

wherein said file redirection means performs said redirection using said file mapping database;

providing registry interception means on said client for intercepting all registry calls on said client and redirecting calls that manipulate certain registries to an alternate path;

providing a registry database stored persistently on said client;

wherein said registry database contains mappings of original registry paths to new alternate registry paths;

wherein said registry database is updated with said streamed application program's registry mapping data obtained from said installation information;

wherein said registry interception means uses said registry database to redirect registry calls;

providing an application page cache on said client;

providing application page prefetching means on said client for requesting application pages of said streamed application program from said server;

wherein said application page prefetching means initially populates said application page cache with an initial set of application pages when said streamed application program is installed on said client, said initial set of application pages are specified in said installation information; and

installing the proper icons, aliases, and description onto said client that give the user the proper look and feel of the original application program.

26. The method of claim 25, wherein during execution of said streamed application program said streamed application program generates page requests, said application page prefetching means requests application pages from said server that are not resident in said application page cache and places said requested application pages in said application page cache.

27. The method of claim 25, wherein said application page prefetching means prefetches additional application pages that said streamed application program may need in the future from said server and places said additional application pages in said application page cache, and wherein said additional application pages are selected based on application page profiling data obtained from said installation information.

28. The method of claim 25, wherein the user selects the proper icon or alias to start said streamed application program.

29. The method of claim 25, wherein the user or administrator obtains a subscription to said streamed application program from a subscription server before installation of said streamed application program begins.

5 30. The method of claim 25, wherein said client obtains a license for said streamed application program from a license server before installation of said streamed application program begins.

10 31. The method of claim 30, wherein said license server gives said client an encrypted access token upon acknowledgment of a valid license.

15 32. The method of claim 31, wherein said client passes said encrypted access token to said server for validation before requesting application pages from said server.

20 33. The method of claim 25, wherein during the uninstallation of said streamed application program from said client, said file redirection means removes said streamed application program's file mapping data from said file mapping database.

25 34. The method of claim 25, wherein during the uninstallation of said streamed application program from said client, said registry interception means removes all of said streamed application program's registry mapping data from said registry database.

30 35. The method of claim 25, wherein during the uninstallation of said streamed application program from said client, said application page prefetching means removes all of said streamed application program's application pages from said application page cache.

35 36. The method of claim 25, wherein during the uninstallation of said streamed application program from said client, said proper icons, aliases, and description are removed from said client.

37. A process for installing a streamed application program on a client system and executing said streamed application program on said client while concurrently streaming portions of said streamed application program from a server in a computer environment, comprising the steps of:

providing file redirection means on said client for redirecting file accesses from said client's local file system to the streaming server's file system;

providing a file mapping database stored persistently on said client;

wherein said file mapping database contains a bi-directional mapping of the client file system to the streaming server file system;

wherein said file redirection means performs said redirection using said file mapping database;

providing registry interception means on said client for intercepting all registry calls on said client and redirecting calls that manipulate certain registries to an alternate path;

providing a registry database stored persistently on said client;

wherein said registry database contains mappings of original registry paths to new alternate registry paths;

wherein said registry interception means uses said registry database to redirect registry calls;

providing an application page cache on said client;

providing application page prefetching means on said client for requesting application pages of said streamed application program from said server; and

wherein during execution of said streamed application program said streamed application program generates page requests, said application page prefetching means requests application pages from said server that are not resident in said application page cache and places said requested application pages in said application page cache.

38. The process of claim 37, receiving an installation information block for said streamed application program from said server.

39. The process of claim 38, wherein said application page prefetching means prefetches additional application pages that said streamed application program may need in the future from said server and places said additional application pages in said application page cache, and wherein said additional application pages are selected based on application page profiling data obtained from said installation information.

40. The process of claim 38, wherein said registry database is updated with said streamed application program's registry mapping data obtained from said installation information.

41. The process of claim 38, wherein said file mapping database is updated with said streamed application program's file mapping data obtained from said installation information.

5 42. The process of claim 37, wherein said application page prefetching means initially populates said application page cache with an initial set of application pages when said streamed application program is installed on said client.

10 43. The process of claim 37, wherein the user or administrator obtains a subscription to said streamed application program from a subscription server before executing said streamed application program.

15 44. The process of claim 37, wherein said client obtains a license for said streamed application program from a license server before executing said streamed application program.

20 45. The process of claim 44, wherein said license server gives said client an encrypted access token upon acknowledgment of a valid license.

46. The process of claim 45, wherein said client passes said encrypted access token to said server for validation before requesting application pages from said server.

25 47. An apparatus for installing a streamed application program on a client system and executing said streamed application program on said client while concurrently streaming portions of said streamed application program from a server in a computer environment, comprising:

30 file redirection means on said client for redirecting file accesses from said client's local file system to the streaming server's file system;

a file mapping database stored persistently on said client;

wherein said file mapping database contains a bi-directional mapping of the client file system to the streaming server file system;

35 wherein said file redirection means performs said redirection using said file mapping database;

registry interception means on said client for intercepting all registry calls on said client and redirecting calls that manipulate certain registries to an alternate path;

a registry database stored persistently on said client;

wherein said registry database contains mappings of original registry paths to new alternate registry paths;

wherein said registry interception means uses said registry database to redirect registry calls;

5 an application page cache on said client;

application page prefetching means on said client for requesting application pages of said streamed application program from said server; and

10 wherein during execution of said streamed application program said streamed application program generates page requests, said application page prefetching means requests application pages from said server that are not resident in said application page cache and places said requested application pages in said application page cache.

15 48. The apparatus of claim 47, receiving an installation information block for said streamed application program from said server.

20 49. The apparatus of claim 48, wherein said application page prefetching means prefetches additional application pages that said streamed application program may need in the future from said server and places said additional application pages in said application page cache, and wherein said additional application pages are selected based on application page profiling data obtained from said installation information.

25 50. The apparatus of claim 48, wherein said registry database is updated with said streamed application program's registry mapping data obtained from said installation information.

30 51. The apparatus of claim 48, wherein said file mapping database is updated with said streamed application program's file mapping data obtained from said installation information.

35 52. The apparatus of claim 47, wherein said application page prefetching means initially populates said application page cache with an initial set of application pages when said streamed application program is installed on said client.

53. The apparatus of claim 47, wherein the user or administrator obtains a subscription to said streamed application program from a subscription server before executing said streamed application program.

54. The apparatus of claim 47, wherein said client obtains a license for said streamed application program from a license server before executing said streamed application program.

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55. The apparatus of claim 54, wherein said license server gives said client an encrypted access token upon acknowledgment of a valid license.

56. The apparatus of claim 55, wherein said client passes said encrypted access token to said server for validation before requesting application pages from said server.

57. A program storage medium readable by a computer, tangibly embodying a program of instructions executable by the computer to perform method steps for installing a streamed application program on a client system and executing said streamed application program on said client while concurrently streaming portions of said streamed application program from a server in a computer environment, comprising the steps of:

providing file redirection means on said client for redirecting file accesses from said client's local file system to the streaming server's file system;

providing a file mapping database stored persistently on said client;

wherein said file mapping database contains a bi-directional mapping of the client file system to the streaming server file system;

wherein said file redirection means performs said redirection using said file mapping database;

providing registry interception means on said client for intercepting all registry calls on said client and redirecting calls that manipulate certain registries to an alternate path;

providing a registry database stored persistently on said client;

wherein said registry database contains mappings of original registry paths to new alternate registry paths;

wherein said registry interception means uses said registry database to redirect registry calls;

providing an application page cache on said client;

providing application page prefetching means on said client for requesting application pages of said streamed application program from said server; and

wherein during execution of said streamed application program said streamed application program generates page requests, said application page prefetching means requests application pages from said server that are not

resident in said application page cache and places said requested application pages in said application page cache.

58. The method of claim 57, receiving an installation information block for said
5 streamed application program from said server.

59. The method of claim 58, wherein said application page prefetching means
prefetches additional application pages that said streamed application program
may need in the future from said server and places said additional application
10 pages in said application page cache, and wherein said additional application
pages are selected based on application page profiling data obtained from said
installation information.

60. The method of claim 58, wherein said registry database is updated with
15 said streamed application program's registry mapping data obtained from said
installation information.

61. The method of claim 58, wherein said file mapping database is updated
with said streamed application program's file mapping data obtained from said
20 installation information.

62. The method of claim 57, wherein said application page prefetching means
initially populates said application page cache with an initial set of application
pages when said streamed application program is installed on said client.
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63. The method of claim 57, wherein the user or administrator obtains a
subscription to said streamed application program from a subscription server
before executing said streamed application program.

30 64. The method of claim 57, wherein said client obtains a license for said
streamed application program from a license server before executing said
streamed application program.

65. The method of claim 64, wherein said license server gives said client an
35 encrypted access token upon acknowledgment of a valid license.

66. The method of claim 65, wherein said client passes said encrypted access
token to said server for validation before requesting application pages from said
server.

$$\left\{ \begin{array}{l} \text{if } \text{is_array}(x) \text{ and } \text{is_array}(y) \text{ then } \text{is_array}(x \cup y) \\ \text{if } \text{is_array}(x) \text{ and } \text{is_array}(y) \text{ then } \text{is_array}(x \cap y) \\ \text{if } \text{is_array}(x) \text{ and } \text{is_array}(y) \text{ then } \text{is_array}(x \setminus y) \\ \text{if } \text{is_array}(x) \text{ and } \text{is_array}(y) \text{ then } \text{is_array}(x \times y) \\ \text{if } \text{is_array}(x) \text{ and } \text{is_array}(y) \text{ then } \text{is_array}(x \oplus y) \\ \text{if } \text{is_array}(x) \text{ and } \text{is_array}(y) \text{ then } \text{is_array}(x \otimes y) \\ \text{if } \text{is_array}(x) \text{ and } \text{is_array}(y) \text{ then } \text{is_array}(x \oslash y) \\ \text{if } \text{is_array}(x) \text{ and } \text{is_array}(y) \text{ then } \text{is_array}(x \ominus y) \\ \text{if } \text{is_array}(x) \text{ and } \text{is_array}(y) \text{ then } \text{is_array}(x \oplus y) \\ \text{if } \text{is_array}(x) \text{ and } \text{is_array}(y) \text{ then } \text{is_array}(x \otimes y) \\ \text{if } \text{is_array}(x) \text{ and } \text{is_array}(y) \text{ then } \text{is_array}(x \oslash y) \\ \text{if } \text{is_array}(x) \text{ and } \text{is_array}(y) \text{ then } \text{is_array}(x \ominus y) \end{array} \right.$$